

## Uplink Noise Suppression & Downlink SNR Enhancement Analog Audio Subsystem

### General Description

The LM49155 is a fully integrated audio subsystem designed for portable handheld applications such as cellular phones. The LM49155 combines a Noise Suppression microphone amplifier, a 1.35W mono class D amplifier with ALC, class AB earpiece driver with AGC, a high efficiency, stereo, ground referenced headphone amplifier with click pop suppression and I<sup>2</sup>C modes select and volume control.

The LM49155 features analog fully differential input, and differential output microphone amplifier designed to reduce background acoustic noise, while delivering superb speech clarity in voice communication applications. Downlink SNR enhancement with an advanced acoustic AGC technology to adjust output levels.

The LM49155 speaker amplifier features National's unique output limiter that provides both a no-clip feature and speaker protection. The E<sup>2</sup>S class D amplifier features a patented, ultra low EMI PWM architecture that significantly reduces RF emissions while preserving audio quality and efficiency. The headphone drivers feature National's ground referenced architecture that creates a ground-referenced output from a single, low-voltage supply.

The LM49155 is available in an ultra-small 36-bump micro SMD package (3.434mm x 3.459mm x 0.6mm).

**Notice: This document is not a full datasheet. For more information regarding this product or to order samples please contact your local National Semiconductor sales office or visit <http://www.national.com/support/dir.html>**

### Key Specifications

- Uplink Far Field Noise Suppression  
Electrical FFNS<sub>E</sub> at f = 1kHz 34dB (typ)
- Downlink SNR Enhancement Earpiece Amplifier  
Near-Field SNR Enhancement 6 to 18dB (typ)  
Downlink SNR<sub>I<sub>E</sub></sub> 16dB (typ)
- Class D Loudspeaker Amplifier R<sub>L</sub> = 15μH+8Ω+15μH  
P<sub>OUT</sub>, THD+N ≤ %, V<sub>DD</sub> = 5.0V 1.35W (typ)
- Headphone Amplifier R<sub>L</sub> = 32Ω  
P<sub>OUT</sub>, THD+N ≤ %, HPV<sub>DD</sub> = 1.8V 19mW (typ)

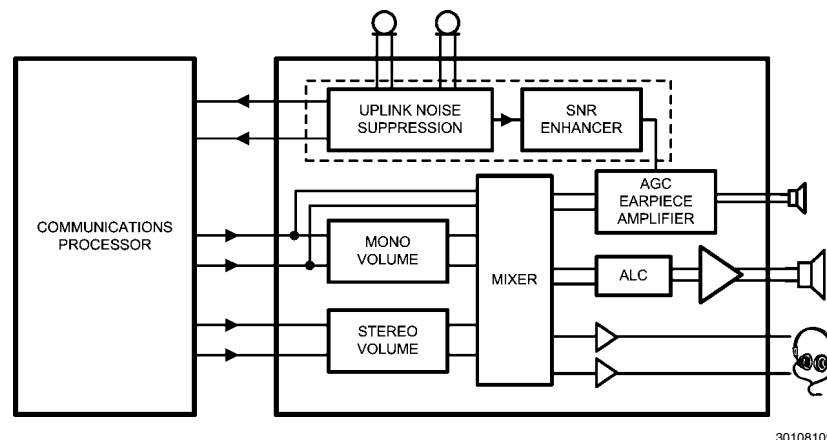
### Features

- Noise cancellation for uplink and downlink without DSP-type artifacts, distortions or delays
- Adapting AGC on ambient noise level & downlink signal strength for earpiece
- Downlink adjustable noise-reducing high pass filter
- E<sup>2</sup>S Class D Amplifier with ALC
- Ground Referenced Headphone Outputs with Advanced Click Pop Suppression
- Micro-power shutdown

### Applications

- Mobile Phones
- Portable Electronic Devices

### Simplified Block Diagram



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# Typical Application

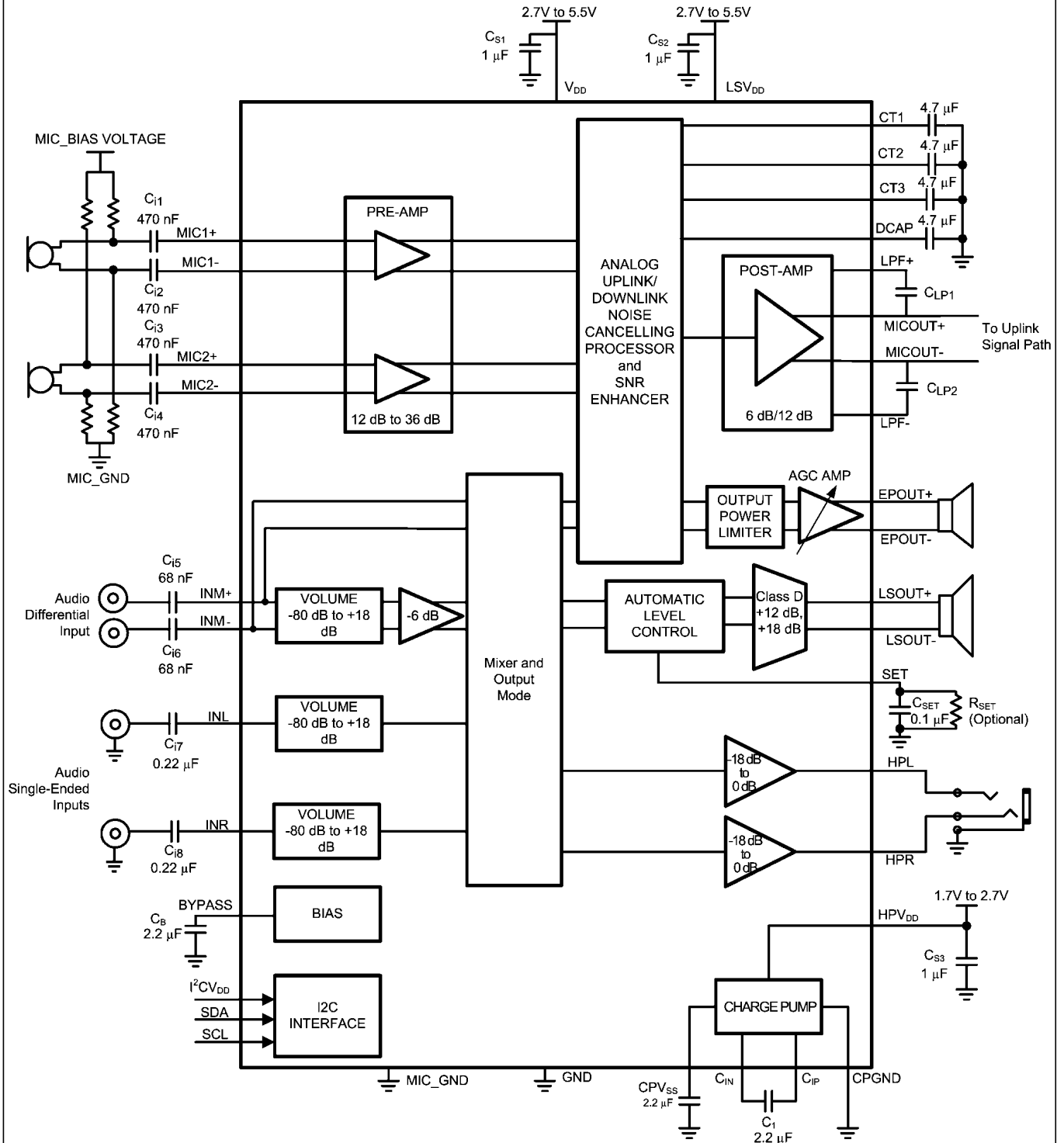


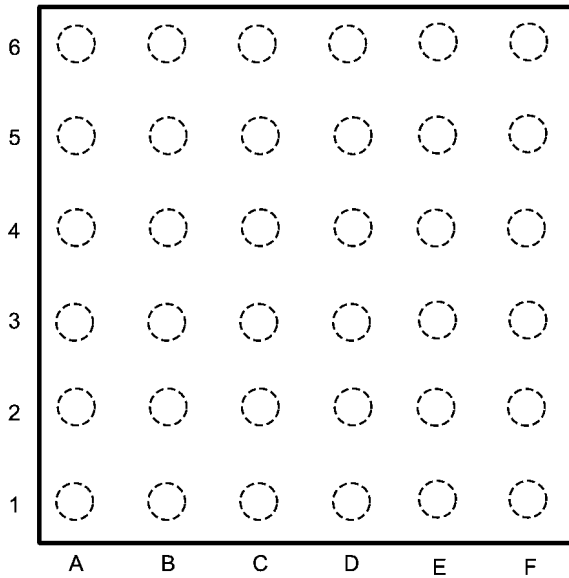
FIGURE 1. Typical Application Circuit

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# Connection Diagrams

**TL Package**  
(3.434mm x 3.459mm x 0.6mm)

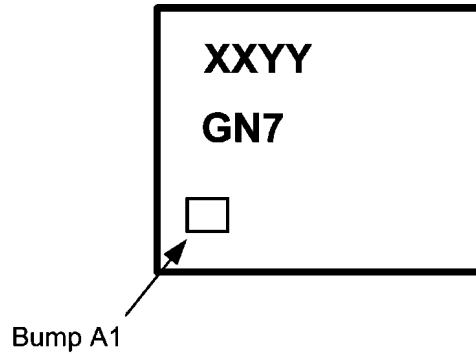
Top View



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**Top View (Bump Side Down)**  
Order Number LM49155TL  
See NS Package Number TLA36STA

**36 Bump micro SMD Marking**



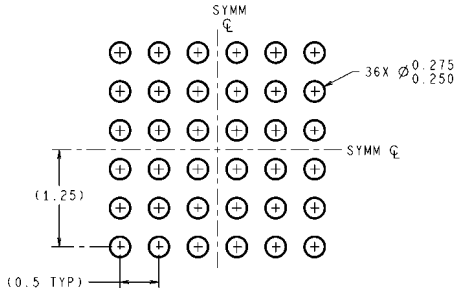
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**Top View**  
XX — Date Code  
YY — Die Traceability  
G — Boomer  
N7 — LM49155TL

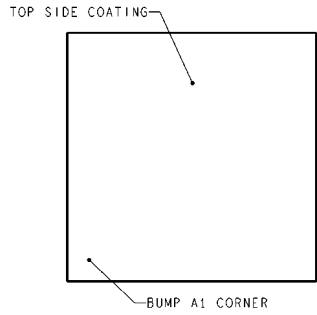
## Ordering Information

Order Number	Package	Package DWG #	Transport Media	MSL Level	Green Status
LM49155TL	36 Bump microSMD	TLA36STA	250 units on tape and reel	1	NOPB
LM49155TLX	36 Bump microSMD	TLA36STA	3000 units on tape and reel	1	NOPB

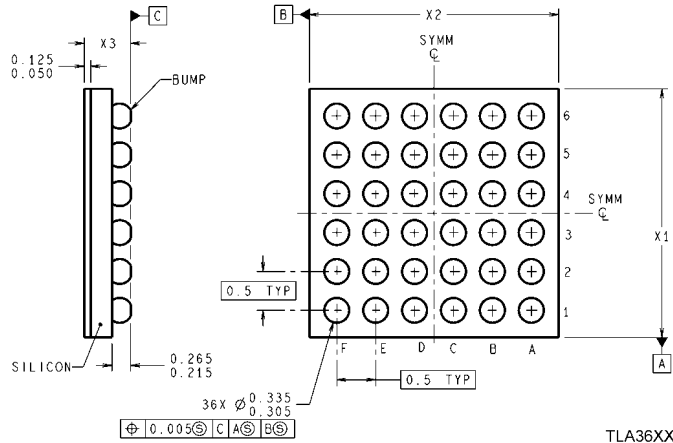
**Physical Dimensions** inches (millimeters) unless otherwise noted



LAND PATTERN RECOMMENDATION



DIMENSIONS ARE IN MILLIMETERS  
DIMENSIONS IN ( ) FOR REFERENCE ONLY



**micro SMD-36 Package**  
**Order Number LM49155TL**  
**NS Package Number TLA36STA**

TLA36XXX (Rev D)

# Notes

LM49155

## Notes

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Data Converters	<a href="http://www.national.com/adc">www.national.com/adc</a>	Samples	<a href="http://www.national.com/samples">www.national.com/samples</a>
Interface	<a href="http://www.national.com/interface">www.national.com/interface</a>	Eval Boards	<a href="http://www.national.com/evalboards">www.national.com/evalboards</a>
LVDS	<a href="http://www.national.com/lvds">www.national.com/lvds</a>	Packaging	<a href="http://www.national.com/packaging">www.national.com/packaging</a>
Power Management	<a href="http://www.national.com/power">www.national.com/power</a>	Green Compliance	<a href="http://www.national.com/quality/green">www.national.com/quality/green</a>
Switching Regulators	<a href="http://www.national.com/switchers">www.national.com/switchers</a>	Distributors	<a href="http://www.national.com/contacts">www.national.com/contacts</a>
LDOs	<a href="http://www.national.com/ldo">www.national.com/ldo</a>	Quality and Reliability	<a href="http://www.national.com/quality">www.national.com/quality</a>
LED Lighting	<a href="http://www.national.com/led">www.national.com/led</a>	Feedback/Support	<a href="http://www.national.com/feedback">www.national.com/feedback</a>
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PowerWise® Solutions	<a href="http://www.national.com/powerwise">www.national.com/powerwise</a>	Applications & Markets	<a href="http://www.national.com/solutions">www.national.com/solutions</a>
Serial Digital Interface (SDI)	<a href="http://www.national.com/sdi">www.national.com/sdi</a>	Mil/Aero	<a href="http://www.national.com/milaero">www.national.com/milaero</a>
Temperature Sensors	<a href="http://www.national.com/tempensors">www.national.com/tempensors</a>	SolarMagic™	<a href="http://www.national.com/solarmagic">www.national.com/solarmagic</a>
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